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A NOTE ON THE TEMPERATURES OF THE AIR OBSERVED AT MOCHUDI.

By J. R. Sutton, Sc.D., F.R.S.S.A.

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Mr. W. A. H. Harbor has recently sent me for inspection his records of meteorological observations taken at Mochudi, in the Bechuanaland Protectorate. Although the period covered by the observations is short, running only to four years and nine months, the results are of interest not only in themselves, but because of the lack of published information concerning the climatology of that Province. Only the temperatures of the air are dealt with in this note.

Table 1 gives for the period spoken of—

1. The average maximum and minimum temperatures for each month, and for the year;
2. The greatest and least temperatures observed in each month;
3. The greatest and least of the mean maximum and minimum temperatures of each month;
4. The extreme ranges observed.

It appears from this Table that the maximum temperatures are closely dependent upon the sun's meridian altitude, resembling in this respect the maximum temperatures observed at Kimberley. How closely can only be determined when sufficient observations have been accumulated to allow of the averages being adequately represented by a formula. Meanwhile it can be seen that while the curve representing the maximum temperatures has its least value some time between the middle and end of June, the greatest value comes some days earlier than the December solstice. On the other hand, the curve of minimum temperatures has its least value early in July and its greatest value late in January.

A comparison between the temperatures observed at Mochudi and those of some other inland places is worth attention. In Table 2 this comparison is made for Kimberley, Elim, and Bulawayo. Evidently the curve of maximum temperature has its greater value earlier or later as the latitude is lower or higher. We see, moreover, how slowly the days cool off as the summer progresses into autumn inside the tropics, compared with what happens outside even so close up as Mochudi is. It is curious, however, that the turning-points of the curve of minimum temperature are practically unaffected by the latitude, albeit the range of the curve varies from place to place.

It is not unlikely that the maximum temperatures at such places as Elim and Bulawayo are dependent not only upon the altitude of the sun, but also upon the rainfall of tropical Africa. In Northern Rhodesia the rainy season has settled in in earnest in November, and with it a mitigation of the fierce summer heat. Bulawayo feels the benefit of this mitigation very quickly; and it may be that the period of time by which the highest point of the Mochudi curve of maximum temperature anticipates the December solstice represents the influence of the tropical rainy season upon the climate of the Bechuanaland Protectorate.

The range of temperature at Mochudi is considerable. A temperature exceeding 100° is possible—one might say probable—in any of the seven months September to March, while freezing temperatures are common from May to September. This last month, so far, has shown the greatest extreme range of any, namely, a maximum of 108° in 1910 and a minimum of 28° in 1912.

In various previous papers it has been shown that the curves of mean maximum temperature for places as far apart as Durban, East London, and Kimberley show a pronounced dip about the middle of July. Cold days are to be expected in most years at this period; and occasionally this cold penetrates at least as far north as Bulawayo; while curiously enough the nights are not very much affected. Stewart finds the same condition at Cape Town, and at Colonies Plaats, near Graaff Reinet. It is interesting, therefore, to find that it also appears to hold at Mochudi. In Table 3 will be found the mean daily maximum and minimum temperatures for Mochudi during July, showing quite plainly the average coldest day on the 16th. This cold wave may, then, be regarded as proved common to the whole of South Africa outside the tropics, so far as the maximum temperatures are concerned. There is a similar, though less important, cold spell affecting the nights, however, as much as, if not more than, the days, during the last week of May.

TABLE 1.

AIR TEMPERATURES AT MOCHUDI.

	Mean Max.	Mean Min.	Highest.	Lowest.	Greatest Monthly Mean Max.	Least Monthly Mean Min.	Extreme Range.
	°	°	°	°	°	°	°
Jan.	92·9	65·1	106	55	97·6	62·2	51
Feb.	89·8	64·7	100	52	92·8	61·5	48
Mar.	86·2	60·4	104	48	90·8	58·6	56
April	83·2	52·7	95	33	85·2	48·8	62
May	77·5	43·1	92	25	81·3	38·9	67
June	73·5	35·4	86	24	74·6	33·0	62
July	74·8	34·5	89	24	79·9	32·9	65
Aug.	80·1	40·8	95	26	81·5	39·8	69
Sept.	86·8	47·7	108	28	89·4	43·9	80
Oct.	89·3	56·2	102	37	91·7	52·9	65
Nov.	92·6	60·6	107	48	98·4	56·5	59
Dec.	94·3	63·7	108	49	99·5	59·2	59
Year	85·1	52·1	108	24	99·5	32·9	84

TABLE 2.

COMPARISON OF TEMPERATURES.

	Maxima.				Minima.			
	Kimberley.	Mochudi.	Elim.	Bulawayo.	Kimberley.	Mochudi.	Elim.	Bulawayo.
S. lat....	28° 41′	24° 21′	23° 7′	20° 9′				
E. long.	24° 45′	26° 6′	30° 1′	28° 35′				
Altitude	3,944	3,105	3,900	4,469				
Nearest coast.	340	445	250	390				
No. of years.	15	5	5	15	15	5	5	15
	°	°	°	°	°	°	°	°
Jan. ...	88·8	92·9	80·8	81·9	61·6	65·1	63·4	61·6
Feb. ...	88·0	89·8	78·4	79·6	61·2	64·7	62·5	60·5
Mar. ...	82·9	86·2	78·2	79·5	57·4	60·4	60·6	58·9
April ...	77·0	83·2	76·7	78·5	50·4	52·7	55·3	54·3
May ...	70·1	77·5	74·8	74·3	42·1	43·1	51·1	49·0
June ...	64·7	73·5	70·5	69·6	36·1	35·4	46·9	44·5
July ...	65·9	74·8	69·9	69·8	35·8	34·5	46·3	44·1
Aug. ...	71·0	80·1	75·5	76·0	38·9	40·8	50·1	47·6
Sept. ...	78·0	86·8	78·4	81·3	45·8	47·7	56·1	53·5
Oct. ...	81·5	89·3	80·9	85·9	50·9	56·2	58·4	59·2
Nov. ...	86·1	92·6	80·1	83·8	54·9	60·6	60·7	60·4
Dec. ...	89·6	94·3	81·2	82·1	60·4	63·7	63·3	61·1
Year ...	78·6	85·1	77·1	78·5	49·6	52·1	56·2	54·6

Altitude, in feet above the sea. Nearest coast, distance in miles.

TABLE 3.

MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURES AT MOCHUDI.

	Max.	Min.
	°	°
July 1	71·5	30·0
2	70·3	33·5
3	71·2	33·8
4	73·8	33·0
5	75·0	31·5
6	75·3	29·5
7	77·7	31·2
8	76·7	29·3
9	76·5	33·5
10	73·3	33·3
11	71·2	30·3
12	74·5	30·5
13	73·8	33·2
14	78·3	32·5
15	71·5	35·0
16	66·8	32·8
17	68·5	33·5
18	71·2	30·3
19	74·3	32·0
20	76·3	30·5
21	76·3	34·8
22	79·0	32·5
23	80·3	36·5
24	78·5	35·5
25	77·0	37·0
26	77·5	39·3
27	78·3	38·8
28	79·8	40·0
29	74·5	38·5
30	74·5	35·5
31	74·3	36·5